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10/571,083	03/06/2006	Alexandr V. KOZLOV	1000-0085	2409

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EXAMINER	
KASSA, ZEWDU A	

ART UNIT	PAPER NUMBER
2611	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/571,083	KOZLOV, ALEXANDR V.	
	Examiner	Art Unit	
	ZEWDU KASSA	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 August 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to communication filled on 8/17/09. Claims 1-17 are pending on this application.

2. Applicant's arguments with respect to claims 1-17 have been fully considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hyll (US 6005893) in view of Cheung (IEEE@1999).

3. As per claim 1, a method for performing bit loading in a multicarrier communication system, comprising: obtaining transmission coefficients α_n, for subchannels of a multicarrier channel, where n is a subchannel index

(Hyll, Abstract " An optimal bit allocation is determined … for all subchannels …", Col 12 L6-14); calculating initial cost values for said subchannels using said transmission coefficients (Hyll, Fig. 10 item 102, " … for all subchannels … thresholding is employed to make initial bit assignment."); identifying a subchannel n having a lowest cost value (Hyll, Col12 L15-23); allocating a new bit to said identified subchannel n (Hyll, Col12 L15-23); and updating said cost value of said identified subchannel n, after allocating a new bit (Hyll, Col 12 L15-23, Fig. 10 item 108).

2. Hyll does not explicitly teach using a cost function: $\Delta P = f(C_n) - g(\alpha_n)$ where C_n, is a number of bits allocated to a subchannel n, $f(C_n)$ is a function of C_n, that returns a baseline cost value for allocating an additional bit to subchannel n, and $g(\alpha_n)$ is a function of transmission coefficient α. Cheng teaches using a cost function: $\Delta P = f(C_n) - g(\alpha_n)$ where C_n, is a number of bits allocated to a subchannel n, $f(C_n)$ is a function of C_n, that returns a baseline cost value for allocating an additional bit to subchannel n, and $g(\alpha_n)$ is a function of transmission coefficient α (Cheung Yui -see Section III and IV). Thus, it would have been obvious to one having ordinary skill in the art, at the time the invention was made, to implement the instant limitation, as taught by Cheung, in the apparatus of Hyll because Cheung teaches the benefit of implementing such a function so that to improve the performance,

and effectiveness of a communication system (Cheung, Page 1747 Section I Col 2).

5. As per claim 2, Hyll in view of Cheung teaches the method of claim 1, further comprising: repeating identifying, allocating, and updating for a total of K iterations, where R is a number of bits to be allocated (Cheung, Section III).

6. As per claim 3, Hyll in view of Cheung teaches the method of claim 1, wherein: said function $g(\alpha_n)$ is equal to $\log((\alpha_n)^2)$, which is the logarithm of the square of the channel coefficient of subchannel n (Cheung, Section III).

7. As per claim 4, Hyll in view of Cheung teaches the method of claim 1, wherein: updating said cost value includes retrieving a value for $f(C_n)$ from a first lookup table (While Cheng teaches a cost function [section II, III, IV], storing and retrieving data from a memory or look up table is well known in the art. Furthermore, Hyll teaches storing functions - see Col 9 L56-59).

8. As per claim 5, Hyll in view of Cheung teaches the method of claim 1, wherein: updating said cost value includes retrieving a value for $g(\alpha_n)$ from a second lookup table (While Cheng teaches a cost function, storing and

retrieving data from a memory or look up table is well known in the art. Furthermore, Hyll teaches storing functions - see Col 9 L56-59).

9. As per claim 6, Hyll in view of Cheung teaches the method of claim 1, wherein: calculating initial cost values includes evaluating the cost function: $\Delta P = f(0) - \log((\alpha_n)^2)$ for each subchannel, where f(0) is a baseline cost value assuming no allocated bits for a subchannel n and $\log((\alpha_n)^2)$ is the logarithm of the square of the channel coefficient of subchannel n (Cheung, Section III, Section I).

10. As per claim 7, Hyll in view of Cheung teaches the method of claim 6, wherein: calculating initial cost values includes retrieving a value for f(0) from a first lookup table (While Cheng teaches a cost function [section II, III, IV], storing and retrieving data from a memory or look up table is well known in the art. Furthermore, Hyll teaches storing functions - see Col 9 L56-59).

11. As per claim 8, Hyll in view of Cheung teaches the method of claim 6, wherein: calculating initial cost values includes retrieving values for $\log((\alpha_n)^2)$ from a second lookup table for subchannels of said multicarrier channel (While Cheng teaches a cost function [section II, III, IV], storing and

retrieving data from a memory or look up table is well known in the art. Furthermore, Hyll teaches storing functions - see Col 9 L56-59).

12. As per claim 9, Hyll in view of Cheung teaches the method of claim 1, wherein: obtaining transmission coefficients includes acquiring said transmission coefficients from a local channel estimator (Hyll, Col 8 L58-61).

13. As per claim 10, Hyll in view of Cheung teaches the method of claim 1, wherein: obtaining transmission coefficients includes receiving said transmission coefficients from a remote communication entity (Hyll, Col 8 L5-16, Furthermore it is well known to receive a transmission coefficient from a remote communication entity or transceiver.).

14. As per claim 11, Hyll teaches an apparatus comprising: a channel determination unit to obtain transmission coefficients α_n for subcharmels of a multicarrier channel (Hyll, Abstract " An optimal bit allocation is determined … for all subchannels …", Col 12 L6-14); a bit allocation calculator to determine bit allocations for said subchannels of said multicarrier channel using said transmission coefficients (Hyll, Fig. 10 item 100, 102, 108).

15. Hyll does not explicitly teach said bit allocation calculator to calculate cost values for said subchannels as a difference between a first function and a second function; a first lookup table to store and retrieve values of said first function for use by said bit allocation calculator; and a second lookup table to store and retrieve values of said second function for use by said bit allocation calculator. **Cheung** teaches said bit allocation calculator to calculate cost values for said subchannels as a difference between a first function and a second function (Cheung, Section III, IV); a first lookup table to store and retrieve values of said first function for use by said bit allocation calculator; and a second lookup table to store and retrieve values of said second function for use by said bit allocation calculator (While Cheng teaches a first and second cost function [section II, III, IV], storing and retrieving data from a memory or look up table is well known in the art. Furthermore, Hyll teaches storing functions - see Col 9 L56-59). Thus, it would have been obvious to one having ordinary skill in the art, at the time the invention was made, to implement the instant limitation, as taught by Cheung, in the apparatus of Hyll because Cheung teaches the benefit of implementing such a function so that to improve the performance, and effectiveness of a communication system (Cheung, Page 1747 Section I Col 2).

16. As per claim 12, Hyll in view of Cheung teaches the apparatus of claim 11, wherein: said first function is a function that returns a threshold cost of allocating an additional bit to a subchannel based on a presently allocated number of bits (Hyll, Fig. 10 item 100, 102, 108).

17. As per claim 13, Hyll in view of Cheung teaches the apparatus of claim 11, wherein: said second function is a function that returns a logarithm of a square of a transmission coefficient for a corresponding subchannel (Cheung, Section III).

18. As per claim 14, Hyll in view of Cheung teaches the apparatus of 61aim 11, wherein: said channel determination unit is a channel estimator to estimate said transmission coefficients using training signals received via said multicarrier channel (It is well known in the art to use a training sequence to estimate a channel condition or a subchannel condition).

19. As per claim 15, Hyll in view of Cheung teaches the apparatus of claim 11, wherein: said bit allocation calculator is operative to: calculate initial cost values for said subchannels of said multicarrier channel assuming zero bits allocated to each subchannel (Hyll, Section III),identify a subchannel with a lowest cost value, allocate an additional bit to said identified

subchannel (Hyll, Col12 L15-23) and update a cost value of said identified subchannel using information from said first and second lookup tables (While Cheng teaches a cost function [section II, III, IV], storing and retrieving data from a memory or look up table is well known in the art. Furthermore, Hyll teaches storing functions - see Col 9 L56-59)..

20. As per claim 16, Hyll in view of Cheung teaches the apparatus of claim 15, wherein: said bit allocation calculator is operative to: identify a subchannel with a lowest cost value, allocate an additional bit to said identified subchannel, and update a cost value (Hyll, Section III), of said identified subchannel using information from said first and second lookup tables for each bit to be included within a multicarrier symbol (While Cheng teaches a cost function [section II, III, IV], storing and retrieving data from a memory or look up table is well known in the art. Furthermore, Hyll teaches storing functions - see Col 9 L56-59). .

21. As per claim 17, Hyll in view of Cheung teaches the apparatus of claim 11, wherein: said multicarrier channel is an orthogonal frequency division multiplexing (OFDM) channel (Hyll, Col 1 L17-18 "DMT").

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ZEWDU KASSA whose telephone number is (571)270-5253. The examiner can normally be reached on Monday - Friday (7:30 - 5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Payne can be reached on 571 272 3024. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

zk

/David C. Payne/

Supervisory Patent Examiner, Art Unit 2611